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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,754	03/23/2004	Marvin Klein	04LT001	4299

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EXAMINER	
MILLER, ROSE MARY	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 12/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/807,754	KLEIN ET AL.	
	Examiner	Art Unit	
	Rose M. Miller	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2004 and 30 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8,9,12-14,16,17,19-21,23,24 and 26* is/are rejected.

7)☒ Claim(s) *10,11,15,18,22 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because empty diagram boxes are impermissible under 37 CFR §1.83(a) which recites as follows:

> *"The drawing in a nonprovisional application must show every feature of the invention specified in the claims. However, conventional features disclosed in the description and claims, where their detailed illustration is not essential for a proper understanding of the invention, should be illustrated in the drawing in the form of a graphical drawing symbol or a* ***labeled*** *representation (e.g., a* ***labeled*** *rectangular box)." (Emphasis added by Examiner)*

The empty diagram boxes 101, 113, 201, 202, 203, 205, 301, 303, 305, 403, 501, 502, 503, 504, 506, 507, 509, 510, and 511 found in Figures 1, 2, 3, 4, and 5 of the drawings, must be labeled with an appropriate descriptive phrase in addition to the reference legend all ready present. Appropriate correction is required.

Replacement drawing sheets including the correction are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "509" has been used to designate both "a 90° phase shifter" and a "narrow band filter" (see paragraph [0064]). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application or a correction made in the specification. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the use of two transducers, the use of hydraulic pressure, gas pressure, or gravity for forming the stream of coupling liquid, the introduction of an electrical time delay into the signal path via analog electronic means or via a separate ultrasonic delay line (drawings only show use of impedance matching, no indication of time delay), the use of either a phase modulator or a frequency modulator to perform a calibration of the vibrational characteristic of the target (not shown in Figure 5, only discussed in specification), and the contact accelerometer in contact with the ultrasonic transducer (accelerometer only shown in contact with outside of fluid chamber) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-2, 4-6, 8-9, 12-14, 16-17, 19-21, 23-24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Blessing et al. (US 4,738,139)** in view of **Parker et al. (US 5,086,7765)**.

Blessing et al. discloses a method for ultrasonically monitoring a target comprising causing a stream of a fluid (12) to flow from an outlet (see Figures) in a chamber (11) to the target (19); providing an ultrasonic beam of a predetermined frequency in the fluid (see column 3 lines 12-26 and column 5, lines 34-40), converting a reflected ultrasonic beam to a return electrical signal (see column 1 lines 12-36); and providing a measure of the surface roughness of the target (19).

Blessing et al. discloses the claimed invention with the exception of the ultrasonic beam being a carrier beam and demodulating the return electrical signal so as to provide a measure of a vibrational characteristic of the target.

Parker et al. teaches using a Doppler shifted waveform generated by reflecting ultrasound waves off a vibrating object to determine the vibrational characteristics of the object. The Doppler shifted waveform inherently includes a "carrier beam" and demodulating the return ultrasonic waves to produce the vibrational characteristic of the object.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Blessing et al.** to include a determination of the vibrational characteristics of the target as **Blessing et al.** includes the use of a spectral content of the echo pulse to determine characteristics of the test object and one of ordinary skill in the art would recognize the advantages of using a Doppler shifted waveform system to determine those characteristics of the target and more characteristics as taught by **Parker et al.** as such would merely be an extension of the pulse echo system disclosed by **Blessing et al.**

With regards to claim 2, **Blessing et al.** clearly discloses a transducer (13) in contact with the fluid in the chamber (11).

With regards to claim 4, **Blessing et al.** discloses monitoring a workpiece in a cutting environment.

With regards to claim 5, it is inherent in the use of the Doppler shifted waveform of **Parker et al.** that the ultrasonic carrier beam be a focused ultrasonic beam. A focused beam produces less speckle or erroneous reflections due to the spreading of the ultrasonic beam and allows for a smaller area to be tested. This is well known throughout the art of measuring and testing, which is why many systems utilize focus ultrasonic measuring beams to perform their testing on targets. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a focused ultrasonic beam when adding the Doppler shifted waveform system to the system of **Blessing et al.**

With regards to claim 6, **Blessing et al.** discloses utilizing a frequency of 5 MHz at column 4, line 36 which is well within the claimed range of 100 kHz to 10 MHz.

With regards to claim 8, **Blessing et al.** discloses utilizing a liquid pump (18) to cause the fluid to flow from the chamber to the target.

With regards to claim 9, it is inherent in a Doppler system that the system measure the vibrational characteristics comprising surface displacement and surface velocity as these are the vibrational elements which produce the Doppler shifted reflected ultrasonic waves. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the characteristics of surface displacement and surface velocity as the vibrational characteristic being measured when adding the Doppler shifted waveform system to the system of **Blessing et al.** as these are the characteristics best measured by the Doppler shifted waveform.

With regards to claim 12, **Blessing et al.** discloses an apparatus for testing a target (19) comprising a fluid (12), a chamber (11) containing the fluid (12) and having an outlet (see Figures) through which a stream of the fluid is caused to flow from the chamber to the target (19), a fluid source (see Figures, inherent in system) in fluid communication with said chamber, a means for causing the fluid to flow from said fluid source through said chamber (11) to the target (19) (pump 18); a driver for providing an electrical signal (inherent in pulser/receiver 25) a transducer (13) in contact with the fluid (12) in the chamber (11) and driven by said driver (25) to generate an ultrasonic beam that is propagated along the stream (15) of the fluid to the target

(19), wherein said transducer (13) also detects a reflected ultrasonic beam (see column 3, lines 13-27) from the target (19) and generates a return electrical signal; a directional coupler (inherent in pulser/receiver circuitry 25) disposed between said driver and said transducer, and a processor (27) for processing the return signal so as to provide a measure of the characteristics of the target (19).

Blessing et al. discloses the claimed invention with the exception of the ultrasonic beam being a carrier beam and demodulating the return electrical signal so as to provide a measure of a vibrational characteristic of the target.

Parker et al. teaches using a Doppler shifted waveform generated by reflecting ultrasound waves off a vibrating object to determine the vibrational characteristics of the object. The Doppler shifted waveform inherently includes a "carrier beam" and demodulating the return ultrasonic waves to produce the vibrational characteristic of the object.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Blessing et al.** to include a determination of the vibrational characteristics of the target as **Blessing et al.** includes the use of a spectral content of the echo pulse to determine characteristics of the test object and one of ordinary skill in the art would recognize the advantages of using a Doppler shifted waveform system to determine those characteristics of the target and more characteristics as taught by **Parker et al.** as such would merely be an extension of the pulse echo system disclosed by **Blessing et al.**

With regards to claim 13, **Blessing et al.** discloses utilizing a liquid pump (18) to cause the fluid to flow from the chamber to the target.

With regards to claim 14, **Blessing et al.** clearly indicates the system provides a laminar flow between the transducer (13) and the target (19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Blessing et al.** with baffles as it is known in the art that the baffles improve the laminar flow of a system with little or no effect on the transmission and reception of the ultrasonic testing beams.

With regards to claims 16 and 17, **Blessing et al.** teaches utilizing a tube (17) for directing, confining and protecting the stream of fluid between the chamber and the test object (19).

With regards to claim 19, see the rejection of claim 12 above. **Blessing et al.** clearly indicates at column 3 lines 25-27 that the single transducer may actually be two separate transducers, one to transmit and one to receive.

With regards to claim 20, **Blessing et al.** discloses utilizing a liquid pump (18) to cause the fluid to flow from the chamber to the target.

With regards to claim 21, **Blessing et al.** clearly indicates the system provides a laminar flow between the transducer (13) and the target (19). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Blessing et al.** with baffles as it is known in the art that the baffles improve the laminar flow of a system with little or no effect on the transmission and reception of the ultrasonic testing beams.

With regards to claim 23 and 24, **Blessing et al.** teaches utilizing a tube (17) for directing, confining and protecting the stream of fluid between the chamber and the test object (19).

With regards to claim 26, **Blessing et al.** discloses an apparatus for testing a target (19) comprising a fluid (12), a chamber (11) containing the fluid (12) and having an outlet (see Figures) through which a stream of the fluid is caused to flow from the chamber to the target (19), a fluid source (see Figures, inherent in system) in fluid communication with said chamber, a fluid pump (18); a driver for providing an electrical signal (inherent in pulser/receiver 25) a transducer (13) in contact with the fluid (12) in the chamber (11) and driven by said driver (25) to generate an ultrasonic beam that is propagated along the stream (15) of the fluid to the target (19), wherein said transducer (13) also detects a reflected ultrasonic beam (see column 3, lines 13-27) from the target (19) and generates a return electrical signal; a directional coupler (inherent in pulser/receiver circuitry 25) disposed between said driver and said transducer, and a processor (27) for processing the return signal so as to provide a measure of the characteristics of the target (19).

Blessing et al. discloses the claimed invention with the exception of the ultrasonic beam being a carrier beam and demodulating the return electrical signal so as to provide a measure of a vibrational characteristic of the target.

Parker et al. teaches using a Doppler shifted waveform generated by reflecting ultrasound waves off a vibrating object to determine the vibrational characteristics of the object. The Doppler shifted waveform inherently includes a "carrier beam" and demodulating the return ultrasonic waves to produce the vibrational characteristic of the object.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Blessing et al.** to include a determination of the vibrational characteristics of the target as **Blessing et al.** includes the use of a spectral content of the echo

pulse to determine characteristics of the test object and one of ordinary skill in the art would recognize the advantages of using a Doppler shifted waveform system to determine those characteristics of the target and more characteristics as taught by **Parker et al.** as such would merely be an extension of the pulse echo system disclosed by **Blessing et al.**

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Blessing et al.** in view of **Parker et al.** as applied to claim 1 above, and further in view of **Rollwitz et al. (US 3,585,577)**.

Blessing et al. in view of **Parker et al.** teaches the claimed invention with the exception of a continuous ultrasonic beam as the transmitted ultrasonic beam.

Rollwitz et al. teaches that it is known in the art of ultrasonic Doppler testing to utilize a continuous ultrasonic beam as the interrogating beam as the transducer can be utilized as both transmitter and receiver due to the shift in frequency of the return signal.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a continuous ultrasonic beam as the interrogating beam in the system of **Blessing et al.** in view of **Parker et al.** as **Rollwitz et al.** teaches the advantages of using a continuous beam system for determining the characteristics of the target under test. Furthermore, **Blessing et al.** teaches utilizing two ultrasonic transducers, one for transmitting and one for receiving. It is well known throughout the art of ultrasonic measuring and testing that the use of separate transmitters and receivers allows for a continuous stream of ultrasonic waves as neither transducer needs to be switched from one mode to the next. Therefore, one of ordinary skill in the art would have known the advantages of utilizing a continuous beam so that any change within the target, including a miss cut or a tool breakage, can be determined immediately and without delay, thereby causing the least amount of damage.

Allowable Subject Matter

8. Claims 3, 10-11, 15, 18, 22, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest a method for ultrasonically detecting vibration of a target, comprising, in combination with the other recited steps, either measuring a noise produced by vibration of the at least one transducer and canceling the noise signal from the return electrical signal, introducing either an electrical time delay into the signal path via an analog electronic means or a separate ultrasonic delay line in order to provide a signal enhancement, or calibrating the vibrational characteristic of the target by providing a phase modulator or a frequency modulator.

The prior art of record fails to teach and/or suggest a device for ultrasonically detecting a vibration of a target comprising, in combination with the other recited elements, a contact accelerometer for detecting vibration of the transducer or a phase modulator or a frequency modulator for calibrating the demodulator.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Erdman (US 2,751,783) discloses an apparatus for coupling ultrasonic waves to a target.

Djordjevic et al. (US 4,507,969) discloses an ultrasonic liquid jet probe.

Light et al. (US 5,001,932) discloses an ultrasonic squirter.

Sato et al. (US 5,076,102) discloses a tool monitor utilizing acoustic emissions generated by the interaction of the tool and the workpiece.

Lin (US 6,068,597) discloses a vibrational resonance ultrasonic Doppler spectrometer and imager.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M. Miller whose telephone number is 571-272-2199. The examiner can normally be reached on Monday - Friday, 7:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RMM
6 December 2005

HEZRON WILLIAMS
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